

17 a preselected power supply voltage.

1 28. The direct current sum bandgap voltage comparator of  
2 claim 27, wherein the currents sources supply currents  
3 according to a bandgap equation:

$$K_1 (V_{CC} - V_T) + K_1 V_T = K_2 V_{BE} + K_3 (kT/q)$$

4  
5 where  $V_{CC}$  is the power supply voltage,  $V_T$  is the threshold  
6 voltage,  $V_{BE}$  is a base emitter voltage, and  $kT/q$  is equal to a  
7 thermal voltage where  $k$  is Boltzman's constant,  $T$  is the  
8 temperature in kelvin,  $q$  is the electronic charge, and  $K_1$ ,  $K_2$ ,  
9 and  $K_3$  are constants.

1 29. The direct current sum bandgap voltage comparator of  
2 claim <sup>27</sup>28, wherein the plurality of current sources are current  
3 mirrors.

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C7  
1 30. The direct current sum bandgap voltage comparator of  
2 claim 3, wherein the plurality of current sources are current  
3 mirrors.--

#### REMARKS

Claims 1, 4-14, and 17-30 are pending in the present application. Claims 2-3 and 15-16 were canceled; claims 1, 4-7, 9-10, 14, 17, 21, and 23-24 were amended; and claims 27-30 were added. Reconsideration of the claims is respectfully requested.

#### I. Objection to the Disclosure

The examiner has objected to the disclosure because of the describe operation of the circuit shown in **Figure 2** and also stating that the description is not clearly understood. In particular, the examiner stated:

Page 12, line 11, states that "the sum of the currents at node **VSUM** may be set equal to zero" (underlining added). This statement is not clearly understood because according to Kirchoff's current, the current into any node at any given time must be equal to zero. The sizes of

the transistors used should not and cannot effect the sum of the current at the summing node. It would be clearly understood by one skilled in the art that the sizing of the transistors can only affect the level of the voltage at the summing node **VSUM**, not the current. Appropriate correction is required.

Office Action dated, April 4, 1995, paper no. 4, page 2. In response to the examiner's objection to the disclosure, the use of the term "may be" has been eliminated from page 12, line 11. Based on the examiner's comments, page 12, line 11 and other portions of the specification were amended to make clear only voltage at the summing node **VSUM**, and not the current are affected by changes. In addition, the specification was amended to correct for other inaccuracies and typographical errors. These changes are believed to be supported by the other portions of the specification and by the figures and equations set forth in the application. Therefore, no new matter has been added by these changes. Consequently, the objection to the specification has been overcome.

## **II. Objection to the Abstract**

The examiner has objected to the abstract for similar reasons as described above with the specification. In response to the examiner's comments, the abstract was amended to correct for the deficiencies noted by the examiner.

## **III. 35 U.S.C. § 112, Second Paragraph**

The examiner has rejected claims 1-26 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. This rejection is respectfully traversed.

In claim 1, line 7, the examiner stated that it was not understood how the "current at semi node" can be equal to zero only when the power supply voltage is equal to a preselected voltage. The examiner stated that it is clear from Kirchoff's Current Law that such will always be equal to zero. In response to the examiner's comments, claim 1 was amended to

remove that language from claim 1.

Claim 2 was canceled.

With respect to claim 3, this claim was canceled, but the limitations were moved into claim 1. The examiner stated that no antecedent basis was present for "the threshold voltage" or "the base emitter voltage". In response to the examiner's comments, the claim was amended to provide antecedent basis for the terms. In addition, the examiner did not understand how " $kT/q$ " can be the "threshold voltage". Claim 3 is amended to recite that this is equal to the "thermal voltage".

With respect to claim 4, the examiner stated that no antecedent basis was present for "the plurality of current mirrors" and suggested that "mirrors" should be changed to "sources". After considering the examiner's comments, claim 4 was amended as suggested by the examiner.

The examiner rejected claim 5 stating that it was not understood what was meant by "a threshold voltage in the first current mirror". The examiner reasoned that stating that the "threshold voltage" is in the first current mirror is vague and confusing. In response to the examiner's comments, claim 5 was amended to eliminate the use of this language. Claim 6 and 7 were amended similarly in response to the examiners comments with respect to these claims.

With respect to claim 9, the examiner stated that no support was found in the specification for a "clamping circuit" which is connect to the summing node. The examiner also did not understand how a voltage swing can be "selected". With reference to **Figure 3** in the disclosure, support is found for a clamping circuit. In particular, the circuitry pointed to by reference numeral 26 is a clamping circuit. In addition, the specification recites:

A clamping circuit 26, well known to those of ordinarily skill in the art, may be added to provide a bias to set the voltage swing at node **VSUM** between selected or preset voltages. Clamping circuit 26 includes transistors **D1-D4** and inverter 30. Transistors **D1** and **D2** are n-channel MOSFETs, while transistors **D3** and **D4** are p-channel MOSFETs. Transistors **D1** and **D2**

have their drains connected to power supply voltage  $V_{cc}$ ; transistors D3 and D4 have their drains connected to ground power supply voltage GND. The sources of transistors D2 and D3 are connected to node VSUM. Other clamping circuits other than the one depicted also may be used with the comparator of the present invention.

Specification, page 14, line 29-page 15, line 7.

The examiner stated that it was not understood what was meant by "interposed". In response to the examiner's comments, the claim was amended to recite that the cascode stage was located between the summing node and the current mirrors.

With respect claims 14-26, the same comments or amendments made with respect to claims 1-13 are made for corresponding claims 14-26.

Therefore, the rejection of claims 1-26 under 35 U.S.C. § 112, second paragraph has been overcome.

IV. 35 U.S.C. § 102(b), Anticipation

The examiner has rejected claims 1-3, 14-16, and 18 under 35 U.S.C. § 102(b) as being anticipated by *Bingham*. This rejection is respectfully traversed.

In rejecting claim 1-3, 14-16, and 18 as being anticipated by *Bingham*, the examiner stated:

*Bingham* discloses, in Figs. 1 and 3, a circuit comprising: "a first circuit (20 of Fig. 1)"; "a direct current sum bandgap voltage comparator (36 and 56 of Fig. 3)" having "a summing node (52 of Fig. 3)", "a plurality of current sources (110 and 116 of Fig. 3)" and "an indicator circuit (56 of Fig. 3)"; "a switching circuit (40 and 48 of Fig. 3)"; "a primary power supply (14 of Fig. 1)"; and "a secondary power supply (22 of Fig. 1)", all connected and operating similarly as recited by Applicant.

Office Action dated, April 4, 1995, paper no. 4, page 3.

*Bingham* does not anticipate the presently claimed invention in claims 1-3, 14-16, and 18 because each every feature of the presently claimed invention in these claims are

not shown in this cited reference. In particular, the *Bingham* reference does not teach using the bandgap equation recited in claim 1 as amended. Applicant fails to find any express teaching in *Bingham* for supplying currents according the following bandgap equation

$$K_1(V_{CC}-V_T) + K_1V_T = K_2V_{BE} + K_3(kT/q)$$

Furthermore, *Bingham* does not teach, suggest, or give any incentive to make the needed changes to reach the presently claimed invention. Absent, the examiner pointing out some teaching or inventive to implement *Bingham* using the bandgap equation to supply currents to the summary node, one of ordinary skill in art would not be led to modify *Bingham* to reach the present invention when the reference is examined as a whole. Absent some teaching, suggestion, or incentive to modify *Bingham* in this manner, the presently claimed invention can be reached only through an improper use of hindsight using the applicants' disclosure as a template to make the necessary changes to reach the claimed invention.

V. Objection to the Claims

The examiner has stated that claims 4-13, 17, and 19-26 would be allowable if rewritten to overcome the rejection under 35 U.S.C. § 112 and to include the limitations of the base claim and any intervening claims. In response to the examiner's comments, the claims were rewritten to include the necessary limitations of the base claims and any intervening claims and to overcome the rejection under 35 U.S.C. § 112.

VI. New Claims 27-30

New claims 27-30 have been added to the application. These claims are patentable over *Bingham* because claim 27 and recite that the current sources are directly connected to a power supply voltage. No such features found in *Bingham*. In addition, *Bingham* does not provide any teaching, suggestion, or incentive for such a connection of current sources. Furthermore, dependent claims such as dependent claim 28 recites that the current sources apply currents according to

the bandgap equation:

$$K_1 (V_{CC} - V_T) + K_1 V_T = K_2 V_{BE} + K_3 (kT/q)$$

As mentioned before, *Bingham* provides no such express teaching. Additionally, the examiner has failed to point out any teaching, suggestion, or incentive for one of ordinary skill in the art to modify *Bingham* to supply currents from current sources in such a manner. In addition, claim 30 recites that the current sources are current mirrors.

Although the number of current mirrors are not recited, the use of current mirrors is believed to be patentable over the cited reference. Therefore, claims 27-30 are patentable over the cited reference and are in a condition for allowance.

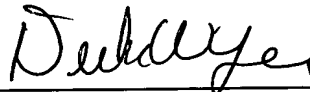
VII. Conclusion

It is respectfully urged that the subject application is patentable over *Bingham* and is now in condition for allowance.

The examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

DATE: July 5, 1995

Respectfully submitted,



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